



MANAGERIAL COGNITION: A REVIEW AND RECONCEPTUALISATION

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ABSTRACT

The managerial cognition construct has been used in strategic management literature to illustrate various organisational phenomena related to organisational capabilities building and strategic outcomes.

This article reviews the relevant literature to determine key dimensions of this construct and offer a reconceptualisation of managerial cognition. Based on the dynamic theory and managerial cognition perspective, this article distinguishes between cognition of environment and cognition of resources as two subsets of managerial cognition.

This article then advances that cognition of the environment and cognition of resources can differentially and complementarily influence the creation of capabilities of an organisation and its competitive advantage.

1. Introduction

In strategic management literature, the managerial cognition construct has been used by researchers to clarify various organisational phenomena related to organisational capabilities building and strategic outcomes. The interest in the interpretive side of organisations, in general, started in the early 1980s (Kaplan, 2011). Since that time, research on manager's cognition has increased significantly. Despite the growing use of this construct, the study of managerial cognition remains difficult. The motive may be due to two reasons: first, the ambiguity and diversity of managerial cognition definition, components, antecedents, and outcomes; second, past studies are fragmented and do not explain clearly how managerial cognition can enhance capabilities formation and a firm's competitive performance (Cho and Linderman, 2019, Eggers and Kaplan, 2013, Helfat and Martin, 2015, Hodgkinson and Healey, 2011, Yang et al., 2019). As explained by Eggers and Kaplan (2013), past studies on managerial cognition consider different parts of the elephant without an appreciation of the whole elephant. These issues highlight a need for more clarity on the domain and operationalisation of the managerial cognition construct (Eggers and Kaplan, 2013, Kaplan, 2011, Mostafiz et al., 2019b), in order to provide a deeper understanding of how the manager's cognitive process can contribute to capabilities building and strategic change at the organisational level (Helfat and Martin, 2015, Vecchiato, 2017, Yang et al., 2019).

This article proposes a reconceptualisation of managerial cognition as a dynamic capability concerning to capabilities creation, and to achieve co-specialisation among capabilities that can enhance a firm's competitive advantage. Research on capabilities development (Eggers and Kaplan, 2013; Helfat and Martin, 2015; Wang et al., 2018) offers new insights into the study of managerial cognition. Researchers have argued that managerial cognition is central to capabilities creation. That is because capabilities are embedded in a manager's decisions to create new configurations of resources and activities that better match the environment (Eggers and Kaplan, 2013; Fainshmidt et al., 2019). Additionally, capabilities are created and modified through a manager's interpretations of their value in shaping the required activities to achieve competitive performance (Shang et al., 2019).

This article suggests that managerial cognition exists as two subsets of environmental and resource cognition. Cognition of environment relates to a manager's interpretation of environmental signals, followed by identifying opportunities for the development of his or her firm. Cognition of resources links to a manager's understanding of resources fungibility that has an effect on renewal directions and on formulating a firm's competitive strategies. Resources fungibility is the potential of resources to shift to alternative uses (Autio et al., 2011; Mannor et al., 2015). As argued by Danneels (2011), fungibility is essential for exercising and developing dynamic capability required for renewal. A review of prior research shows that most researchers have given considerable attention to the role of the manager's cognition of the environment in shaping organisational capabilities and strategic competitive actions. The role of the manager's cognition of resources fungibility, however, has received less attention when compared to the cognition of the environment. This article assumes that cognition of resources provides a firm with the strategic flexibility to create new combinations using the firm's

existing resources to exploit the opportunities in the environment. By doing so, cognition of resources allows firms to sustain competitive advantage even in a turbulent environment.

This article makes three contributions to the literature. First, it argues that managerial cognition is a means to achieve a fit between capabilities and the environment (Eggers and Kaplan, 2013; Helfat and Martin, 2015, Tarka, 2019). This article broadens the theoretical explanation and interpretation of managerial cognition by considering it as a driver or source of managerial actions that enable effective rebuilding and reconfiguring of other organisational competencies and capabilities and then providing the firm with multiple sources of competitive advantage (Barney, 1991). Also, this conceptualisation facilitates the analysis of managerial cognition by enabling researchers to explore and evaluate different antecedents and consequences of this construct. Second, by recognising the role and importance of various components of managerial cognition, this article sets the stage for future research on the relationships among these components and their contributions to strategic change and organisational performance.

Further, by identifying and examining managerial cognition dimensions, this article contributes to clarifying the development and evolution of dynamic capabilities that determine the pathways for organisational adaptation. Third, by identifying conditions under which the two components of managerial cognition can create value, this article provides some insights into the questions, "What drives the differences in firms' performance?"; and "How do firms sustain their competitive advantage over time?". These questions are essential for the analysis and understanding of a firm's adaptation and capabilities development.

2. Past Research on Managerial Cognition

A central question in strategic management literature is what drives a firm's strategic actions. The traditional perspective of the role of capabilities on firms' competitiveness has provided partial answers to this question. In a parallel track, the cognitive perspective has developed to explain strategic actions (Egbunike et al., 2019; Eggers and Kaplan, 2013). Authors have argued that internal and external factors affect a firm's competitive advantage differently based on managerial cognition of those factors inside and outside the firm (Aragon-Correa and Sharma, 2003). It has been suggested that capabilities are necessary but not sufficient for achieving sustained competitive advantage (Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003; Vecchiato, 2017). That is because capabilities are subject to the manager's interpretation of environmental changes, which, in turn, translate those interpretations into strategic choices (Kaplan, 2011, Yang et al., 2019). In this context, researchers have used the managerial cognition construct to explain organisational phenomena related to capabilities building and strategic outcomes.

In recent times, the number of studies on managerial cognition has increased. Such an increase may have resulted from the need for integrative capabilities and cognitive approach in the strategic management field (Andersén and Kask, 2012; Cho and Linderman, 2019; Eggers and Kaplan, 2013; Helfat and Martin, 2015, Yang et al., 2019). That is to say, to explain the impact of a manager's cognition on capabilities development and how these capabilities, in turn, affect the firm's competitiveness (Eggers and Kaplan, 2013, Helfat and Martin, 2015, Shang et al., 2019).

Table 1 summarises some of the studies that have used managerial cognition. The table shows that researchers have studied the effects of different dimensions of managerial cognition on different types of outcomes such as firm's performance (Mannor et al., 2015, Mostafiz et al., 2019b); capabilities building (Douglas et al., 2012, Martin and Bachrach, 2018); innovation (Manral, 2011, Yang et al., 2019); and competitive advantage (Autio et al., 2011). However, it is unclear if these dimensions converge to capture and conceptualise similar attributes of managerial cognition. This article then addresses this issue.

Past research noted an implicit consensus about the role of managerial cognition on capabilities formation and a firm's competitiveness. Yet, the definition and conceptualisation of a manager's cognition and its synonyms, such as 'cognitive processes, mental models, cognitive schemas, manager's perception, attention, etc., (refer Kaplan, 2011, for a list of all such synonyms), vary widely in the literature. Some scholars have used the managerial cognition construct without a definition (E.g., Barr, 1998; Degraev, 2011 Iederan et al., 2011; Liang and Picken, 2011; Meng and Layton, 2011; Pitelis and Wagner, 2019, Wang et al., 2018). Some other scholars have defined this construct broadly to indicate, for example, "the knowledge structures that people use to make assessments, judgments or decisions involving opportunity, evaluation, and venture creation, and growth" (Mitchell et al., 2002). Another indication has been "perceptions of valuable goals and appropriate means to pursue them" (Autio et al., 2011). Analysis of past research reveals that definitions of managerial cognition converge to some extent and differ in highlighting various dimensions of this construct, as summarised in Table 2.

Gavetti and Levinthal (2000) present the most widely cited definition of managerial cognition, viewing it as, "forward-looking form of intelligence that is premised on actors' beliefs about the linkage between the choice of action and the subsequent impact of those actions on outcomes. Such beliefs are derived from the actors' mental models of the world". In their optimistic view about managers' cognition, they assert that valuable opportunities as a source of competitive strategies are cognitively identified. Thus, this requires managers to overcome the firm's knowledge and investigate the distance to see the peaks of performance that others cannot (Schmidt, 2015). A review of past research shows that managerial cognition has been identified differently in the literature. Many terms have been used to indicate this construct,

for example, manager's mental models (Manral, 2011, Yang et al., 2019); actors' beliefs derived from mental models (Degrauel, 2011, Gavetti and Levinthal, 2000, Kor and Mesko, 2013, Laamanen and Wallin, 2009, Maitland and Sammartino, 2015, Mandal et al., 2009); knowledge structures (Combe et al., 2012, Mannor et al., 2015, Mitchell et al., 2002, Mostafiz et al., 2019b); subjective representations (Nadkarni and Barr, 2008); and noticing, encoding, interpreting, and focusing (Ocasio, 1997). These cognitive processes have been used to reflect the ability to: link the choice of actions and their subsequent impact on outcomes (Gavetti and Levinthal, 2000, Martin and Bachrach, 2018); achieve performance consequences (Autio et al., 2011, Combe et al., 2012, Mostafiz et al., 2019b); and for evaluation, venture creation, and growth (Mitchell et al., 2002, Wang et al., 2018). As Table 2 indicates, there is no agreement on the dimensionality of managerial cognition. Meanwhile, as summarised in Table 1, past studies have been based on conceptual or case studies. As a result, extant literature lacks a unified conceptualisation of managerial cognition in general, and more importantly, no agreement about what constitutes the managerial cognition construct. There is also a lack of empirical studies that capture the rich theoretical arguments of the managerial cognition construct. Future studies on managerial cognition need to reconceptualise the construct and its various dimensions and clearly define each.

3. A Reconceptualisation of Managerial Cognition

Based on the dynamic capabilities (DC) theory and consistent with prior works that consider dynamic capabilities as a manager's ability to integrate, build and reconfigure existing resources and routines into new capabilities that can achieve competitive advantage (Eisenhardt and Martin, 2000, Fainshmidt et al., 2019, Zahra et al., 2006), managerial cognition can be seen as a dynamic capability pertaining to capabilities creation, and to achieve co-specialisation between organisational capabilities that can enhance a firm's competitive advantage.

Past research summarised in Tables 1, and 2 shows different points of view among researchers in conceptualising the dimensions of managerial cognition. Some researchers have considered that a manager's cognition is the process of managerial interpretations of the environment (Aragon-Correa and Sharma, 2003; Nadkarni and Barr, 2008, Thomas et al., 1993, Yang et al., 2019). This process helps to develop a better representation of the environmental changes and to develop a better response to the complexity of the external environment (Fainshmidt et al., 2019). Other researchers have considered that cognition of resources fungibility is the managerial cognition process (Autio et al., 2011; Danneels, 2011; Degrauel, 2011; Mannor et al., 2015). This process helps in resource allocations and integration of a firm's existing capabilities to generate new capabilities required to sustain its competitive advantage (Mannor et al., 2015). Some other researchers have referred to a manager's cognition as a multidimensional construct. For example, it has encompassed: the processes to cope with the complexity of contextual conditions and organisational conditions (Manral, 2011); perception of the external environment using simplified mental models to make sense of unconnected information (Mitchell et al., 2011, Mitchell et al., 2002); and two forms of subjective representations, attention focus and environment-strategy causal logic (Nadkarni and Barr, 2008). Ocasio (1997) identifies that the cognition process includes: making sense of the environmental problems, opportunities, and threats; and the available alternatives for firms, such as proposals, routines, projects, programs, and procedures.

Further, managerial cognition has been conceptualised as managers' interpretations of environmental events, and managers' interpretations of organisational resources and capabilities (Barr, 1998, Eggers and Kaplan, 2013, Wang et al., 2018). Although some scholars have used similar definitions for managerial cognition, they have different conceptualisations of this construct's dimensions. For example, Combe et al. (2012) define managerial cognition as "managers' beliefs and their knowledge of how to achieve performance consequences". They conceptualise this construct as strategic schemas used by managers to interpret external data about customers and competitors. On the other hand, Autio et al. (2011) define managerial cognition as "perceptions of valuable goals and appropriate means to pursue them"; they hence conceptualise this construct as managerial cognition of resources fungibility.

Table 1: Past Studies on Managerial Cognition¹

Dimensionality	Study	Sample/Data	Theoretical lens	Treatment/Modeling	Outcomes
Cognition of environment	Kor and Mesko, 2013	Conceptual	Dynamic capabilities / Managerial competencies	Develops a theory about the interplay between how executive teams conceptualise their business and dynamic managerial capabilities, including cognition	Managerial cognition affects the way that managers conceptualize their business and make critical decisions for resource allocation
	Ambrosini and Bowman, 2009	Conceptual	Dynamic capabilities	Reviews and synthesises the literature to explain how dynamic capabilities are shaped and created, and their relationship with performance	The way through which managers interpret environmental issues, affects their decisions and actions. Dynamic capabilities are contingent on both environmental dynamism and on managers' interpretation of their business environment
	Aragon-Correa and Sharma, 2003	Conceptual	RBV, dynamic capabilities and contingency theories	Proposes a generic theory of how the characteristics of the business environment impact the dynamic capability development on competitive advantage	The extent to which a dynamic capability can effect positively on firm's competitive advantage is contingent on external factors that affect each firm differently via managerial interpretation
Cognition of resources	Douglas <i>et al.</i> , 2012	Case study	RBV and dynamic capabilities	Develops a model for application to the private sector as a basis for understanding managers' perceptions of high performance in a local authority	Managers' perception of capabilities influences the regeneration of firm's capabilities that are necessary for sustained competitive advantage
	Autio <i>et al.</i> , 2011	Longitudinal multiple case study	Cognition and capabilities literature	Develops a cognition-based model of capability emergence in new ventures	Resources fungibility positively moderates the relationship between situational uncertainty and formation of new capabilities. Interplay between managerial cognition of resources fungibility and processes constitute a potentially important source of a firm's competitive advantage
	Danneels, 2011	Historical case study	Capabilities and cognition literature	Provides insights into the resource alteration processes by which dynamic capability operates	Managerial cognition of resources fungibility is essential to explain the exercise of dynamic capability and its effects on directions of renewal pursued by firms
Multidimensional	Helfat and Peteraf, 2015	Conceptual	Dynamic capabilities	Identifies specific types of cognitive capabilities that are likely to underpin dynamic managerial capabilities and explain their potential impact on strategic change of organisations	The heterogeneity and associated path dependence of cognitive capabilities among top executives is likely to produce heterogeneity of dynamic managerial capabilities, which in turn, may lead to differential performance
	Eggers and Kaplan, 2013	Conceptual	Strategic management	Reviews cognition and capabilities insights in a multi-level cognitive model of capability development and deployment	Cognitive interpretations about the environment and about how resources influence the firms' ability to dedicate scarce resources among capabilities required for competitiveness
	Newey, Verreynne and Griffiths, 2012	Longitudinal case study	Strategy and cognition	Studies interface between the dynamic and operational capabilities in the radical new product development context	A particular mix of processes, knowledge and managerial cognitions is required in order to aid the process of co-specialisation among firm's capabilities
	Manral, 2011	Conceptual	Cognition, creativity and innovation	Proposes a conceptual framework for managerial cognition as bases of innovation	Managerial cognition affects innovation tasks that determine firms' competitive advantage, and supports growth in the global economy
	Nadkarni and Barr, 2008	24 firms in different industries	Cognition and economic view	Managerial cognition as a driver of strategic action	Managerial cognition mediates the relationship between industry context and strategic action Cognition variables are critical factors to explain firms' strategic actions
	Barr, 1998	Six case studies	Strategic management	Develops a model of interpretation evolution depending on whether events are familiar or unfamiliar	Managers' interpretations of environmental events, resources and capabilities influence the organisational actions and strategic adaptation required to compete

¹ The studies listed are representative rather than exhaustive. We have chosen some studies representing the dimensionality of managerial cognition for illustrative purposes.

Table 2: Past conceptualisation of managerial cognition

Definition	Dimensions	Illustrative studies
Cognition: “forward-looking form of intelligence that is premised on actors’ beliefs about the link between the choice of action and the subsequent impact of those actions on outcomes. Such beliefs are derived from the actors’ mental models of the world” (Gavetti and Levinthal, 2000: 113)	• Mental models that determine managers’ interpretation of available material; shape how managers pay attention to the world, view it and act on it • Ability to: - Conceptualise their business - Make critical decisions on resource allocation	Gavetti and Levinthal, 2000; Tripsas and Gavetti, 2000; Degraev, 2011; Mandal, Thomas, and Antunes, 2009; Bettis and Mahalad, 1995; Kim, 1993; Kor and Mesko, 2013; Laamanen and Wallin, 2009; Yang et al. (2019)
Managerial cognition is: “the knowledge structures that people use to make assessments, judgments or decisions involving opportunity evaluation and venture creation and growth” (Mitchell <i>et al.</i> , 2002: 97)	Manager’s perceptions of the external environment include: • Hostility and dynamism using simplified mental models to make sense of unconnected information in order to: - Identify and invent new products or services; and - Assemble the necessary resources to start and grow businesses	Mitchell <i>et al.</i> , 2011; Mitchell <i>et al.</i> , 2002; Mitchell, 2007
Managerial perception of environment is: “firms’ response to a general environment as it is interpreted by the decision-makers” (Aragón-Correa and Sharma, 2003: 76)		Aragón-Correa, and Sharma, 2003; Eggers & Kaplan, (2013); Yang et al., (2019)
Managerial attention: “the noticing, encoding, interpreting and focusing of time and effort by organisational decision-makers on both: (a) issues: the available repertoire of categories for making sense of the environment: problems, opportunities and threats; and (b) answers: the available repertoire of action alternatives: proposals, routines, projects, programs and procedures” (Ocasio, 1997: 189)	Managerial attention include: • Its degree of effort in comprehending and interpreting stimuli; and • Utilising environmental scanning activities to: - Identify new trends and opportunities; and - Integrate new ideas and knowledge with the firm’s existing capabilities	Ocasio, 1997; Cho and Hambrick, 2006; Kor and Mesko, 2013
Managerial resource cognition: “identification of resources and the understanding of their fungibility and results in resource schemas” (Danneels, 2011: 21)	A resource schema is the ability to answer questions, such as: - What are our resources?; and - What are the potential applications of our resources?	Danneels, 2011; Danneels, 2002, 2007; Teece, 1982; Marino, 1996; Denrell <i>et al.</i> , 2004 Newey <i>et al.</i> , 2012; Eggers and Kaplan, 2013; Mannor, Shaasie & Conlon (2015)
Managerial cognition: “Perceptions of valuable goals and appropriate means to pursue them” (Autio <i>et al.</i> , 2011:13)	• Resource Fungibility include: - The fungibility of human resources; and - The fungibility of technology resources	Autio <i>et al.</i> , 2011

Building on the past research as summarised in tables 1 and 2, this article defines managerial cognition as managers’ ability based on their beliefs and knowledge derived from their mental models, through which they develop cognitive schemas about the external and internal environments. This article assumes that cognition of the environment and cognition of resources represent two dimensions of managerial cognition. These two dimensions play different but complementary roles in explaining how managerial cognition can influence the creation of a firm’s capabilities and its competitive advantage, as reported in table 1. This definition departs from past research in three ways. First, managerial cognition is viewed as a dynamic capability that is embedded in a manager’s mental model, which is shaped by the manager’s experiences through his or her interactions with the internal and external environments. Such a view makes it possible to analyse the role of managerial cognition for the creation of capabilities and the sustainability of competitive advantage. Second, this definition subsumes and considers the past definitions of managerial cognition presented in table 2. Past research highlights the importance of a manager’s beliefs (Degraev, 2011, Gavetti and Levinthal, 2000, Kor and Mesko, 2013); and knowledge structures (Combe *et al.*, 2012, Mitchell *et al.*, 2002). Danneels (2011) highlights that resource cognition results in resource schemas. Manral (2011) suggests that the managers’ experiences shape cognition through their internal and external environments. According to explanations provided about dynamic capabilities, environmental interpretation, and resource fungibility are integral parts of the DC theory (Augier and Teece, 2009, Shang *et al.*, 2010). Therefore, this definition connects managerial cognition with a firm’s ability to develop new capabilities and provide the firm with multiple sources of competitive advantage (Barney, 1991). Third, this definition considers that managerial cognition is an integrative process to understand the complexity of the external and internal environments. It

suggests that cognition of the environment and cognition of resources are two capabilities that constitute managerial cognition and build upon each other to shape managerial cognition.

At this point, it is essential to distinguish between cognition and managerial cognition to appreciate the merits of our proposed definition and to derive a conceptualisation for this construct. Gavetti and Levinthal (2000) stated cognition as "a forward-looking form of intelligence that is premised on actors' beliefs," and "such beliefs are derived from the actors' mental models of the world." Managerial cognition, however, is directed towards affecting organisational change through the manager's beliefs and knowledge used to cope with internal and external environmental complexity (Combe et al., 2012, Fainshmidt et al., 2019, Manral, 2011). They are strategic in nature (Combe et al., 2012, Iederan et al., 2011, Yang et al., 2019); and, therefore, define the firm's path of evolution and development (Zahra and George, 2002). Based on the (DC) theory, many scholars have noted that managerial cognition has an essential role in the exercise of dynamic and operational capabilities (Danneels, 2011, Egbunike et al., 2019, Gavetti, 2005, Shang et al., 2019). Our definition suggests that cognition of the environment and cognition of resources fungibility are two central capabilities to form other competencies and capabilities. They build on each other to yield managerial cognition capability embedded in managers' decisions to create new configurations of resources activities that better match the environment. These capabilities provide the firm a foundation to achieve a sustainable competitive advantage that can lead to superior performance (Barney, 1991, Shang et al., 2019; Teece, 2007, Teece et al., 1997). In table 3, this article connects cognition of environment and cognition of resources, as two dimensions that make up managerial cognition, to its respective components, roles, and importance. These dimensions are discussed next.

4. Dimensions of Managerial

Table 3 highlights two different but complementary capabilities that constitute managerial cognition: cognition of environment and cognition of resources. Based on Eisenhardt and Martin (2000), this article argues that while dynamic capabilities are undoubtedly different in their details, resulting from how dynamic capabilities are executed and exercised within firms, they have standard features across firms. Next, this article explains the dimensions and how they are combined to produce managerial cognition capability.

Table 3: Dimensions of managerial cognition, components and corresponding role

Dimensions	Components	Role and importance	Citations
Cognition of environment	• Clear representation of the environmental changes • Conceptualisation of environmental changes • Orientation towards the external environment • Advanced knowledge of environmental changes • Utilisation of environmental scanning activities • Development of interpretive schemes or cognitive models	• Identify opportunities for the development of the firms • Manage inter-organisational relationships • React rapidly to the environmental changes • Identify new trends and opportunities • Integrate new ideas and knowledge with the firm's existing capabilities • Organisational restructuring	Mostafiz, Sambasivan & Goh (2019); Martin & Bachrach, 2018; Iederan <i>et al.</i> , 2011; Manral, 2011; Barrales-Molina <i>et al.</i> , 2012; Yang et al., 2019; Kor and Mesko, 2013; Thomas <i>et al.</i> , 1993; Barr <i>et al.</i> , 1992; Mannor et al., 2015
Cognition of resources	• Enhances the multiplicity of possible process combinations • In human resources: - Low role specialisation and broader role definitions among its employees • In technology resources: - Flexibility: adjustable technology to address new product platforms, standards or delivery systems. • Amenability of a resource to diverse applications • The potential applications of a firm's resources • Slack resources	• Coordination flexibility • Ability to: - Build excess and liquid assets - A flexible resource pool - Carry out new combinations using existing resources - Pursuit of organisational resources to support the new ideas - Updated schemas about firm's resources	Yang et al., 2019; Martin & Bachrach, 2018; Wilkens, Lienert & Elfving, 2016; Mannor et al., 2015; Danneels, 2007; Danneels, 2011; Combe <i>et al.</i> , 2012; Lavie, Stettner, and Tushman, 2010; Manral, 2011

4.1 Cognition of environment

Cognition of environment refers to a firm's response to environmental changes that are shaped by developing cognitive schemas that reflect managers' comprehension and interpretation of external stimuli. Managers' cognition of the environment includes interpretation of the competitive environment (Degrauel, 2011, Gavetti and Levinthal, 2000, Laamanen and Wallin, 2009, Mandal et al., 2009, Mostafiz et al., 2019b, Tripsas and Gavetti, 2000, Wang et al., 2018); orientation towards the external environment (Manral, 2011, Martin and Bachrach, 2018); utilisation of environmental scanning activities (Kor and Mesko, 2013, Martin and Bachrach, 2018); advanced knowledge of environmental changes (Barrales-Molina et al., 2012, Yang et al., 2019), and perceptions of the external environment (Helfat and Peteraf, 2015, Mitchell et al., 2002, Mitchell et al., 2007).

These cognitive processes are regarded as the motivator for organisational actions and strategic adaptation required to compete (Barr et al., 1992; Yang et al., 2019). This is because interpretation of information about the contextual factors can help decision-makers to identify the influence of the environment on their firms. Further, it helps to formulate the firm's strategy and the subsequent routines that are consistent with the environment so that environmental opportunities can be better exploited (Aragon-Correa and Sharma, 2003, Mandal et al., 2009, Martin and Bachrach, 2018, Thomas et al., 1993). Moreover, the interpretive schemes that managers develop about environmental changes can lead to organisational restructuring (Barr et al., 1992). For example, the utilisation of environmental scanning activities to identify new trends and opportunities. Then to integrate new ideas and knowledge with the firm's existing capabilities, affect how managers conceptualise their businesses and make critical decisions for resource allocation; this, in turn, supports the firm's ability to achieve external and evolutionary fit (Kor and Mesko, 2013). Yang et al. (2019) and Barrales-Molina et al. (2012) also mention that advanced knowledge of the changes that occur in the environment are interpretive processes that react rapidly to the changes and can generate dynamic capabilities. Similarly, orientation towards the external environment as part of managerial cognition can help managers to manage inter-organisational relationships and to cope with the complexity of the external environment (Manral, 2011).

4.2 Cognition of resources

Cognition of resources refers to a firm's responses to environmental changes that are shaped by developing cognitive schemas that reflect the manager's understanding of the potential uses of a firm's resources. Cognition of resources relates to the firm's ability to use the resources for alternate services (Autio et al., 2011, Danneels, 2011, Martin and Bachrach, 2018); and to achieve competitive strategies (Combe et al., 2012, Eggers and Kaplan, 2013, Feng et al., 2014). It has also been considered as an understanding of resource fungibility (Danneels, 2011), generic (high) vs. specific (low) fungibility. Further amenability of a resource to be used in diverse applications (Danneels, 2002, Danneels, 2007, Mahoney and Pandian, 1992, Mannor et al., 2015, Miller, 2003, Shane, 2000); mental representation of firm's assets (Degrauel, 2011, Helfat and Peteraf, 2015); and flexible resources (Combe et al., 2012).

These cognitive processes are considered as enablers for resource leveraging to pursue environmental opportunities (Danneels, 2007); as an essential factor to effectively implement a chosen strategic option (Combe et al., 2012, Helfat and Peteraf, 2015); and as enhancing high level of performance (Mannor et al., 2015). This is because a firm's decision to allocate its scarce resources to formulate a new capability or improve an operational routine depends on managers' cognitive understanding of firms' resources, and what they can do with available resources (Eggers and Kaplan, 2013, Laamanen and Wallin, 2009). Cognition of resources fungibility comprises different aspects. For example, Danneels (2011) considers the ability to use the resource in alternate uses is essential to explain dynamic capability and for a firm's renewal. Manral (2011) posited that carrying out new combinations using existing resources and the pursuit of organisational resources to support the new ideas can help managers to cope with the complexity of the internal environment.

Combe et al. (2012) also considered that building excess and liquid assets, a flexible resource pool, and slack resources are important factors to implement a chosen strategic option effectively. Assembling necessary resources is also considered an enabler to start and grow businesses (Martin and Bachrach, 2018, Mitchell et al., 2011, Mitchell et al., 2002, Mitchell et al., 2007). Therefore, a manager's cognition of resources and capabilities that underlie the firm's strategy is a significant dimension in resource allocation (Barr, 1998, Wang et al., 2018).

The theoretical distinction between cognition of environment and cognition of resources is essential for many reasons: first, it allows the investigation into why some firms can achieve better adaptation and better exploitation of their resources base, and then thrive in turbulent environments, while other firms fail under the same conditions; and second, it helps to explain better the contribution of the managerial cognition process in formulating organisational capabilities towards competitive advantage. The discussion above clarifies the two dimensions of managerial cognition. Next, this article explains how these dimensions build upon each other to constitute managerial cognition as a dynamic capability that enables a firm to rebuild and reconfigure other organisational competencies and capabilities and their role and importance.

5. The complementary role of cognition of environment and cognition of resources

Managerial cognition is a process that is shaped through managers' experiences and their interactions with internal and external environments (Kor and Mesko, 2013). This cognitive process has a significant impact on a variety of organisational phenomena (Walsh, 1995). For instance, cognition of the environment is the basis by which managers identify the strategic situation of their firms compared to their competitors, then decide on strategic actions that are required to adapt and compete (Manral, 2011, Nadkarni and Barr, 2008). In the same vein, cognition of resources is an essential component through which managers develop cognitive schemas about the possible applications of their firms' existing resources and then develop their ability to exercise their capabilities (Danneels, 2011, Shang et al., 2019). This, in turn, can help to recombine them in different ways to create new combinations using existing resources, to support new ideas, and to effectively implement a chosen strategic option (Combe et al., 2012, Danneels, 2011, Eggers and Kaplan, 2013, Helfat and Peteraf, 2015, Manral, 2011).

This article argues that cognition of the environment and cognition of resources are complementary. Although these two dimensions have different aspects and functions, their roles complement each other towards managerial cognition capability within a firm and influence other capabilities and competitive performance. For example, a firm's manager may be able to identify the possible opportunities in the environment. Still, if he or she is unable to understand the fungibility and the potential uses of the existing resources, the manager will not be able to create new combinations using the firm's existing resources to exploit opportunities. Accordingly, mere identification through the interpretation of the environment is not sufficient to exploit environmental opportunities unless the firm has the resources necessary to use the identified opportunities. An illustrative case study of this situation is presented by Danneels (2011); he finds that managers' inability to understand their resources fungibility led to the failure of Smith Corona to create new combinations of resources and develop their dynamic capabilities to cope with the environmental changes; this eventually led to the demise of the firm that was once a leading manufacturer of typewriters in the world.

In contrast, managers may be able to understand the potential uses of their firms' existing resources and their fungibility. Still, if they are unable to comprehend and interpret the external environmental signals, managers will not be able to develop advanced knowledge of the changes that occur in the environment and identify the possible opportunities. Accordingly, a firm's possession of flexible resources and management's ability to understand resources fungibility are not sufficient unless supported by the ability to interpret new trends and opportunities in the environment. Managerial cognition of resources can help managers to make critical decisions for resource allocation and to formulate new capabilities to exploit the identified opportunities through their interpretation of the environment. A case study of this situation is presented by Gavetti (2005), who explained that the inability of senior managers in Polaroid to interpret the market changes and technological breakthroughs in digital products. Failure to interpret the market changes led them to discourage research activities associated with new market trends, which destroyed the firm's core capabilities in photography imaging.

Studies on strategy also argue that the quality of firms' capabilities and their underlying routines are contingent on the managers' understanding of renewing operational tasks or routines to achieve operational flexibility (Barrales-Molina et al., 2012, Peng et al., 2008). This is because the value of these capabilities in exploiting environmental opportunities and creating a competitive advantage is subject to managers' interpretation of the fit between firms' capabilities and the environment (Eggers and Kaplan, 2013, Yang et al., 2019). Similarly, firms' ability to integrate new ideas and knowledge with the firms' existing capabilities is subject to managers' ability to utilise scanning activities to develop cognitive schemas about the environment and to identify new trends and opportunities. These cognitive schemas can affect how managers conceptualise their businesses and make critical decisions for resource allocation (Feng et al., 2014), which supports the firms' ability to achieve external and evolutionary fit (Kor and Mesko, 2013). This may explain why managers develop different representations as a response to the same environmental change. Thus, different interpretations of managers of environmental changes have led to different procedures in the firms (Iederan et al., 2011), followed by different impacts on competitive advantage. Accordingly, managers' perception of environmental changes is essential to decide on the need to recombine firms' resources and routines to generate new capabilities that better fit the environment. Similarly, managers' understanding of resources fungibility and their potential to create new ways and capabilities are critical factors for firms to recombine their resources to exploit the identified opportunities in the environment.

In sum, misinterpretation of the environment will negatively impact the managers' decision to effectively deploy their capabilities (Ambrosini and Bowman, 2009). Furthermore, misunderstanding of the potential uses of firms' resources will impact negatively on the firms' ability to exploit opportunities. Thus, managers need to reconcile their interpretation of the environment and the potential of the resources in their firms to achieve the required fit for their decisions to assemble resources into capabilities that better respond to environmental changes and achieve competitive advantage. Managers need to identify an environmental opportunity and then consider what resources the firms have, which are essential to locate where to acquire/recombine the resources that the firms lack. Similarly, managers need to identify the potential of their resources to exploit the identified opportunities. The analysis of the relevant literature reveals some outputs that can be formulated through several propositions. These propositions can be considered as essential outputs of this article that can enrich future studies:

- Proposition 1: The greater compatibility between cognition of environment and cognition of resources, the greater the opportunity is for the development of managerial cognition.
- Proposition 2: Firms with well-developed capabilities of cognition of the environment are more likely to achieve a competitive advantage than those with less developed capabilities.
- Proposition 3: Firms with well-developed capabilities of cognition of resources are more likely to achieve a competitive advantage than those with less developed capabilities.
- Proposition 4: Cognition of environment and cognition of resources can differentially and complementarily influence the creation of capabilities of an organisation and its competitive advantage.

6. Managerial Cognition Conceptualisation

In Table 4, this article compares the traditional view of managerial cognition with the proposed reconceptualisation. This article shows key distinctions regarding managerial cognition definitions, dimensions, evolution and development, and value creation. Although the definitions of Aragon-Correa and Sharma (2003); and Ocasio (1997) emphasise the cognition of the environment, they overlook the cognition of resources. As for the definition of Danneels (2011), while it emphasises the cognition of resources, it ignores the cognition of the environment. The proposed reconceptualisation in this article corrects this oversight by considering them as integrative processes that constitute managerial cognition capability. A key difference lies in our definition of managerial cognition as a dynamic capability comprising two dimensions embedded within the managers' beliefs and their knowledge derived from their mental models. Based on the (DC) theory, this article considers managerial cognition a multidirectional and consistent path rather than a one-direction path. This article also suggests that managers' experiences and their interactions with internal and external environments, managers' ability to reconcile their interpretation of the external environment, and their understanding of the firm's resources are sources that influence managerial cognition development. Thus, the proposed definition of managerial cognition offers a broader role of managers in developing their firms' capabilities that can enhance competitive advantage.

Table 4: Comparing managerial cognition conceptualisations

Issue	Traditional view of managerial cognition	Reconceptualisation of managerial cognition
Definition	• A firm's response to the general environment and making sense of the environment: problems, opportunities and threats. Emphasis on the process that constitute a manager's cognition of environment • Identification of resources fungibility in order to develop resource schemas. Emphasis on the process that constitutes a manager's cognition of resources	• Managers' ability based on their beliefs and knowledge derived from their mental models, through which they develop cognitive schemas about the external environment and the internal environments • Emphasis on the process that constitute by manager cognition of environment and resources
Dimensions	• Operationalised as a single component • Multidimensional definition with many dimensions	• Multidimensional definition with two dimensions • Two distinct dimensions (cognition of environment and cognition of resources)
Evolution and development	• Dependent either on a manager's interpretation of external stimuli or manager's understanding of a firm's resources • One direction path	• Dependent on multiple factors, including: - Managers' experiences and their interactions with internal and external environments - Reconciliation of managers' interpretation of the environment and their understanding of the firm's resources to achieve the required fit between decisions to assemble resources into capabilities and environmental changes • Multidirectional and consistent path
Value creation	• Value creation through: - Its effect on innovation tasks - Regeneration of a firm's capabilities	• Value creation is differentially derived from the dimensions that constitute managerial cognition: - Cognition of environment allows identifying the strategic situation of a firm compared to the competitors and identifying the possible opportunities

		- Cognition of resources provides a firm with the strategic flexibility to create new combinations using the firm's existing resources to exploit the identified opportunities in the environment, and then, achieving competitive advantage
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Table 4 also highlights that value creation is a complementary process derived from two distinct dimensions of managerial cognition. While cognition of the environment helps to identify possible opportunities in the environment, cognition of resources provides the strategic flexibility for a firm to reconfigure its existing resources to exploit opportunities previously identified in the environment, and then to achieve competitive advantage. Ambrosini and Bowman (2009) highlight that dynamic capabilities development is contingent on managers' interpretations of their business environment. Autio et al. (2011) also discuss that the fungibility of resources has an essential relationship with capability development required for competitiveness.

7. Conclusion

The purpose of this article is to review the relevant literature to determine the key dimensions of managerial cognition and offer a reconceptualisation of this construct. Managerial cognition in this article is considered as a dynamic capability about capabilities creation and achieving co-specialisation between a firm's capabilities that enhance its competitive advantage. Managerial cognition exists as two subsets: cognition of environment and cognition of resources. Cognition of environment relates to a manager's interpretation of environmental signals and identifying opportunities for the development of a firm. Cognition of resources links to a manager's understanding of resources fungibility that affects the formulation of a firm's strategies and capabilities required to sustain a competitive advantage. These two dimensions build upon each other to constitute managerial cognition as a dynamic capability that enables a firm to rebuild and reconfigure other organisational competencies and capabilities. Therefore, they can differentially and complementarily influence the creation of a firm's capabilities and its competitive advantage. This article sets the stage to view managerial cognition as an integrative process based on an understanding of the complexity of the external and internal environments. We hope that this article can encourage future research on the relationships between these two dimensions and their contributions to strategic change and competitive advantage. Past researchers have recognised the role of managerial cognition in capabilities building and organisational performance. We hope that future research of this concept will consider environment cognition and resources cognition as integrative dimensions that constitute managerial cognition and examine their links to creating and sustaining competitive advantage.

8. Future Research

Past research has highlighted that dynamic capabilities affect competitive advantage significantly and positively (Helfat and Peteraf, 2015, Li and Liu, 2012, Mostafiz et al., 2019b, Schilke, 2013, Yung and Lai, 2012). Eisenhardt and Martin (2000) mention that dynamic capabilities are essential; however, a competitive advantage does not lie in the capabilities themselves, but how these capabilities are used to reconfigure a firm's resources base, which is more important for sustaining competitive advantage. Consistent with this logic, this article clarifies how managerial cognition could be a source of creating and maintaining a competitive advantage by helping in the process of capabilities building required to compete. This article contributes to the body of knowledge about the cognition of the environment and cognition of sources to explain how to sustain a firm's competitive advantage.

Managerial cognition avails opportunities for future research. This article distinguishes between cognition of the environment and cognition of resources as two subsets of the managerial cognition construct. Indeed, the existing studies about managerial cognition have centered on managerial cognition of the environment and managerial cognition of resources. However, there is a lack of studies on the complementary role of these dimensions in structuring and building organisational capabilities. There is, therefore, a need to develop and test a model that incorporates these two components. Such a cognitive model of capability development and deployment will offer specific ideas for future empirical research to explain the role of cognition in the building and assembling capabilities, in organisational adaptation and growth, and in organisational ambidexterity. Researchers also need to consider the complementary role of and the relationship between these dimensions to provide a better understanding of the process of capabilities building required to sustain competitive advantage. This article also provides a reconceptualisation of managerial cognition based on two dimensions: environment cognition and resources cognition. Fundamental differences exist between these two dimensions, which allow them to be measured and validated independently. Future research needs to address the specific operationalisation of the capabilities that constitute managerial cognition. This could be a useful tool to help develop a measure of the managerial cognition construct. Developing a valid and legitimate measure of managerial cognition can facilitate longitudinal studies that link cognition to strategic actions and analysis of causality. Such a measure must be developed, and a review of prior research (Tables 1 and 2) shows that current studies on cognition are mainly conceptual papers, case studies, and literature reviews. To the best of the researchers' knowledge, a model to enable a systematic measurement and evaluation of managerial cognition has yet to be developed. There is a need for a large-scale empirical examination of the role of managerial cognition on a firm's capabilities building and its competitive advantage. Future research could investigate how

managerial actions affect potential capability building, thus improving chances for adaptation. To date, empirical research on deliberate managerial actions concerning the creation of capabilities is underdeveloped.

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